AMENDMENTS TO THE CLAIMS

1 (Currently amended). A thermal actuator (500) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (510) extending between the first support and the second support, the beam having a first side (511), a second side (512), a beam length (518) and a beam mid-point (519), the beam being substantially straight along the first side (511);

the beam comprised of a plurality of beam segments (520, 522, 524), each beam segment of the plurality of beam segments having a beam segment width (525, 526, 527) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (548) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 2 (Canceled).

3 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

4 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

5 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

6 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

7 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam comprises exactly three (3) beam segments.

8 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 3.

9 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam comprises exclusively beam segments having substantially parallel sides.

10 (Currently amended). The thermal actuator of ~~claim 2~~ claim 1, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

11 (Currently amended). A thermal actuator (600) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (610a, 610b, 610c) extending in parallel between the first support and the second support, thus forming a beam array (613);

each beam of the beam array having a first side (611a, 611b, 611c), a second side (612a, 612b, 612c), a beam length (618) and a beam mid-point (619), each beam being substantially straight along its first side (611a, 611b, 611c);

each beam of the beam array comprised of a plurality of beam segments (620, 622, 624), each beam segment of the plurality of beam segments having a beam segment width (625a, 626a, 627a, 625b, 626b, 627b, 625c, 627c, 627c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (614) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (648) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 12 (Canceled).

13 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

14 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein each beam of the beam array is heated by a beam heater current supplied by an included beam input and beam output, thus forming the heating of the beam array.

15 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

16 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

17 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein each beam of the beam array comprises exactly three (3) beam segments.

18 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein each beam of the beam array comprises a plurality (n) of beam segments, where n does not equal 3.

19 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein the beam array comprises exactly three (3) beams.

20 (Currently amended). The thermal actuator of ~~claim 12~~ claim 11, wherein the beam array comprises a plurality (n) of beams, where n does not equal 3.

21 (Currently amended). A thermal actuator (700) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (710) extending between the first support and the second support, the beam having a first side (711), a second side (712), a beam length (718) and a beam mid-point (719), the beam being substantially straight along the second side (712);

the beam comprised of a plurality of beam segments, each beam segment of the plurality of beam segments ~~being~~ having a beam segment width (725, 726, 727) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (748) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase.

Claim 22 (Canceled).

23 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

24 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

25 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

26 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

27 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam comprises exactly three (3) beam segments.

28 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 3.

29 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam comprises exclusively beam segments having substantially parallel sides.

30 (Currently amended). The thermal actuator of ~~claim 22~~ claim 21, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

31 (Currently amended). A thermal actuator (800) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (810a, 810b, 810c) extending in parallel between the first support and the second support, thus forming a beam array (813);

each beam of the beam array having a first side (811a, 811b, 811c), a second side (812a, 812b, 812c), a beam length (818) and a beam mid-point (819), each beam being substantially straight along its second side (812a, 812b, 812c);

each beam of the beam array comprised of a plurality of beam segments (820, 822, 824), each beam segment of the plurality of beam segments having a beam segment width (825a, 826a, 827a, 825b, 826b, 827b, 825c, 826c, 827c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (814) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (848) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase.

Claim 32 (Canceled).

33 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

34 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein each beam of the beam array is heated by a beam heater current supplied by an included beam input and beam output, thus forming the heating of the beam array.

35 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

36 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

37 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein each beam of the beam array comprises exactly three (3) beam segments.

38 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein each beam of the beam array comprises a plurality (n) of beam segments, where n does not equal 3.

39 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein the beam array comprises exactly three (3) beams.

40 (Currently amended). The thermal actuator of ~~claim 32~~ claim 31, wherein the beam array 813 comprises a plurality (n) of beams, where n does not equal 3.

41 (Currently amended). A thermal actuator (900) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (910) extending between the first support and the second support, the beam having a first side (911), a second side (912), a beam length (918) and a beam mid-point (919), the beam being substantially straight along the first side (911);

the beam comprised of a plurality of beam segments (920, 921, 922, 923, 924), each beam segment of the plurality of beam segments having a beam segment average width (925, 931, 926, 933, 927) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment average widths;

wherein the plurality of beam segment average widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (948) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment average widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 42 (Canceled).

43 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

44 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

45 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

46 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

47 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam comprises exactly five (5) beam segments.

48 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 5.

49 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam comprises exactly three (3) beam segments having substantially parallel sides.

50 (Currently amended). The thermal actuator of ~~claim 42~~ claim 41, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

51 (Currently amended). A thermal actuator (1000) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (1010a, 1010b, 1010c) extending in parallel between the first support and the second support, thus forming a beam array (1009);

each beam of the beam array having a first side (1011a, 1011b, 1011c), a second side (1012a, 1012b, 1012c), a beam length (1018) and a beam mid-point (1019), each beam being substantially straight along its first side (1011a, 1011b, 1011c);

each beam of the beam array comprised of a plurality of beam segments (1020, 1021, 1022, 1023, 1024), each beam segment of the plurality of beam segments having a beam segment average width (1025a, 1031a, 1026a, 1033a, 1027a, 1025b, 1031b, 1026b, 1033b, 1027b, 1025c, 1031c, 1026c, 1033c, 1027c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment average widths;

wherein the plurality of beam segment average widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (1048) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 52 (Canceled).

53 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

54 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein each beam of the beam array is heated by a beam heater current by an included beam input and beam output, thus forming the heating of the beam array.

55 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

56 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

57 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein each beam of the beam array comprises exactly five (5) beam segments.

58 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein each beam of the beam array comprises a plurality (n) of beam segments, where n does not equal 5.

59 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein the beam array comprises exactly three (3) beams.

60 (Currently amended). The thermal actuator of ~~claim 52~~ claim 51, wherein the beam array comprises a plurality (n) of beams, where n does not equal 3.

61 (Currently amended). An optical waveguide switch (100d) comprising a thermal actuator (500), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (510) extending between the first support and the second support, the beam having a first side (511), a second side (512), a beam length (518) and a beam mid-point (519), the beam being substantially straight along the first side (511);

the beam comprised of a plurality of beam segments (520, 522, 524), each beam segment of the plurality of beam segments having a beam segment width (525, 526, 527) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (548) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 62 (Canceled).

63 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

64 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

65 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

66 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

67 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 3.

68 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam comprises exactly three (3) beam segments.

69 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam comprises exclusively beam segments having substantially parallel sides.

70 (Currently amended). The optical waveguide switch of ~~claim 62~~ claim 61, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

71 (Currently amended). An optical waveguide switch (100e) comprising a thermal actuator (600), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (610a, 610b, 610c) extending in parallel between the first support and the second support, thus forming a beam array (613);

each beam of the beam array having a first side (611a, 611b, 611c), a second side (612a, 612b, 612c), a beam length (618) and a beam mid-point (619), each beam being substantially straight along its first side (611a, 611b, 611c);

each beam of the beam array comprised of a plurality of beam segments (620, 622, 624), each beam segment of the plurality of beam segments having a beam segment width (625a, 626a, 627a, 625b, 626b, 627b, 625c, 626c, 627c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (614) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (648) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 72 (Canceled).

73 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

74 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein each beam of the beam array is heated by a beam heater current supplied by an included beam input and beam output, thus forming the heating of the beam array.

75 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

76 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

77 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein each beam of the beam array comprises a plurality (n) of beam segments, where n does not equal 3.

78 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein each beam of the beam array comprises exactly three (3) beam segments.

79 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein the beam array comprises a plurality (n) of beams, where n does not equal 3.

80 (Currently amended). The optical waveguide switch of ~~claim 72~~ claim 71, wherein the beam array comprises exactly three (3) beams.

81 (Currently amended). An optical waveguide switch (100f) comprising a thermal actuator (700), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (710) extending between the first support and the second support, the beam having a first side (711), a second side (712), a beam length (718) and a beam mid-point (719), the beam being substantially straight along the second side (712);

the beam comprised of a plurality of beam segments, each beam segment of the plurality of beam segments ~~being~~ having a beam segment width (725, 726, 727) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (748) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase.

Claim 82 (Canceled).

83 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

84 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

85 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

86 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

87 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 3.

88 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, wherein the beam comprises exactly three (3) beam segments.

89 (Currently amended). The optical waveguide switch of ~~claim 82~~ claim 81, wherein the beam comprises exclusively beam segments having substantially parallel sides.

90 (Currently amended). The thermal actuator of ~~claim 82~~ claim 81, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

91 (Currently amended). An optical waveguide switch (100g) comprising a thermal actuator (800), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (810a, 810b, 810c) extending in parallel between the first support and the second support, thus forming a beam array (813);

each beam of the beam array having a first side (811a, 811b, 811c), a second side (812a, 812b, 812c), a beam length (818) and a beam mid-point (819), each beam being substantially straight along its second side (812a, 812b, 812c);

each beam of the beam array comprised of a plurality of beam segments (820, 822, 824), each beam segment of the plurality of beam segments having a beam segment width (825a, 826a, 827a, 825b, 826b, 827b, 825c, 826c, 827c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment widths;

wherein the plurality of beam segment widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (814) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (848) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not decrease and at least sometimes increase.

Claim 92 (Canceled).

93 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

94 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein each beam of the beam array is heated by a beam heater current supplied by an included beam input and beam output, thus forming the heating of the beam array.

95 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

96 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

97 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein each beam of the beam array 813 comprises a plurality (n) of beam segments, where n does not equal 3.

98 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein each beam of the beam array comprises exactly three (3) beam segments.

99 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein the beam array comprises a plurality (n) of beams, where n does not equal 3.

100 (Currently amended). The optical waveguide switch of ~~claim 92~~ claim 91, wherein the beam array comprises exactly three (3) beams.

101 (Currently amended). An optical waveguide switch (100h) comprising a thermal actuator (900), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a beam (910) extending between the first support and the second support, the beam having a first side (911), a second side (912), a beam length (918) and a beam mid-point (919), the beam being substantially straight along the first side (911);

the beam comprised of a plurality of beam segments (920, 921, 922, 923, 924), each beam segment of the plurality of beam segments having a beam segment average width (925, 931, 926, 933, 927) orthogonal to the beam length, the beam thus forming a corresponding plurality of beam segment average widths;

wherein the plurality of beam segment average widths corresponding to the beam vary along the beam length based on a predetermined pattern;

so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (948) generally normal to and outward from the second side;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment average widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 102 (Canceled).

103 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, the heating of the beam provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

104 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, the heating of the beam provided by a beam heater current supplied by an included beam input and beam output.

105 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

106 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam is fabricated in a device layer of a silicon-on-insulator wafer.

107 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam comprises a plurality (n) of beam segments, where n does not equal 5.

108 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam comprises exactly five (5) beam segments.

109 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam comprises exactly three (3) beam segments having substantially parallel sides.

110 (Currently amended). The optical waveguide switch of ~~claim 102~~ claim 101, wherein the beam comprises exactly two (2) beam segments that are substantially equal with respect to their corresponding beam segment lengths and beam segment widths.

111 (Currently amended). An optical waveguide switch (100i) comprising a thermal actuator (1000), the thermal actuator comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (1010a, 1010b, 1010c) extending in parallel between the first support and the second support, thus forming a beam array (1009);

each beam of the beam array having a first side (1011a, 1011b, 1011c), a second side (1012a, 1012b, 1012c), a beam length (1018) and a beam mid-point (1019), each beam being substantially straight along its first side (1011a, 1011b, 1011c);

each beam of the beam array comprised of a plurality of beam segments (1020, 1021, 1022, 1023, 1024), each beam segment of the plurality of beam segments having a beam segment average width (1025a, 1031a, 1026a, 1033a, 1027a, 1025b, 1031b, 1026b, 1033b, 1027b, 1025c, 1031c, 1026c, 1033c, 1027c) orthogonal to the beam length, each beam thus forming a corresponding plurality of beam segment average widths;

wherein the plurality of beam segment average widths corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (1048) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment average widths corresponding to successive beam segments do not decrease and at least sometimes increase, and along the beam length from the beam mid-point to the second support, beam segment widths corresponding to successive beam segments do not increase and at least sometimes decrease.

Claim 112 (Canceled).

113 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, the heating of the beam array provided by an included heater layer disposed on the surface, the heater layer coupled to a heater layer input and a heater layer output.

114 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein each beam of the beam array is heated by a beam heater current supplied by an included beam input and beam output, thus forming the heating of the beam array.

115 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein each beam of the beam array is fabricated of a low-conductivity material of either monocrystalline silicon or polycrystalline silicon.

116 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein each beam of the beam array is fabricated in a device layer of a silicon-on-insulator wafer.

117 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein each beam of the beam array comprises a plurality (n) of beam segments, where n does not equal 5.

118 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein each beam of the beam array comprises exactly five (5) beam segments.

119 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein the beam array comprises a plurality (n) of beams, where n does not equal 3.

120 (Currently amended). The optical waveguide switch of ~~claim 112~~ claim 111, wherein the beam array comprises exactly three (3) beams.

Please add the following twelve (12) new claims 121-132:

121 (New). The thermal actuator (600) of claim 11, wherein the coupling beam (614) intersects only a portion of one beam segment (622) in each beam of the plurality of beams (610a, 610b, 610c) comprising the beam array (613).

122 (New). The thermal actuator (600) of claim 121, wherein the beam array (613) comprises exactly three (3) beams (610a, 610b, 610c) and wherein each beam of said three (3) beams comprises exactly three (3) beam segments (620, 622, 624).

123 (New). The thermal actuator (800) of claim 31, wherein the coupling beam (814) intersects only a portion of one beam segment (822) in each beam of the plurality of beams (810a, 810b, 810c) comprising the beam array (813).

124 (New). The thermal actuator (800) of claim 123, wherein the beam array (813) comprises exactly three (3) beams (810a, 810b, 810c) and wherein each beam of said three (3) beams comprises exactly three (3) beam segments (820, 822, 824).

125 (New). The thermal actuator (1000) of claim 51, wherein the coupling beam (1005) intersects only a portion of one beam segment (1022) in each beam of the plurality of beams (1010a, 1010b, 1010c) comprising the beam array (1009).

126 (New). The thermal actuator (1000) of claim 125, wherein the beam array (1009) comprises exactly three (3) beams (1010a, 1010b, 1010c) and wherein each beam of said three (3) beams comprises exactly five (5) beam segments (1020, 1021, 1022, 1023, 1024).

127 (New). The optical waveguide switch (100e) of claim 71, wherein the coupling beam (614) intersects only a portion of one beam segment (622) in each beam of the plurality of beams (610a, 610b, 610c) comprising the beam array (613).

128 (New). The optical waveguide switch (100e) of claim 127, wherein the beam array (613) comprises exactly three (3) beams (610a, 610b, 610c) and wherein each beam of said three (3) beams comprises exactly three (3) beam segments (620, 622, 624).

129 (New). The optical waveguide switch (100g) of claim 91, wherein the coupling beam (814) intersects only a portion of one beam segment (822) in each beam of the plurality of beams (810a, 810b, 810c) comprising the beam array (813).

130 (New). The optical waveguide switch (100g) of claim 129, wherein the beam array (813) comprises exactly three (3) beams (810a, 810b, 810c) and wherein each beam of said three (3) beams comprises exactly three (3) beam segments (820, 822, 824).

131 (New). The optical waveguide switch (100i) of claim 111, wherein the coupling beam (1005) intersects only a portion of one beam segment (1022) in each beam of the plurality of beams (1010a, 1010b, 1010c) comprising the beam array (1009).

132 (New). The optical waveguide switch (100i) of claim 131, wherein the beam array (1009) comprises exactly three (3) beams (1010a, 1010b, 1010c) and wherein each beam of said three (3) beams comprises exactly five (5) beam segments (1020, 1021, 1022, 1023, 1024).